

**PROGRAM FOR LICENSING ASSESSMENTS  
FOR COLORADO EDUCATORS® (PLACE®)  
OBJECTIVES  
FIELD 040: AGRICULTURE AND RENEWABLE NATURAL  
RESOURCES**

**Subareas**

Agricultural Business Management and Resource Economics  
Agricultural Mechanical Technology  
Horticulture  
Environmental and Natural Resources  
Animal Science  
Plant and Soil Science  
Agricultural Communication, Leadership, and Career Development

**AGRICULTURAL BUSINESS MANAGEMENT AND RESOURCE ECONOMICS**

**Understand agricultural economics and policy.**

Includes basic principles of agricultural economics (e.g., supply and demand) and the relationship between agricultural economics and policy; the influence of various factors (e.g., social pressures, trade) on agricultural policy; state and federal policies and laws related to agriculture; and the effects of these policies and laws on agricultural practices and decision making in Colorado.

**Understand agricultural business management practices.**

Includes characteristics and purposes of business plans for agricultural operations; procedures for scheduling, budgeting, market forecasting, and calculating production costs; factors and skills involved in supervising and scheduling personnel; the use and interpretation of basic statistics; the importance of and methods for keeping accurate business records; applications of computers and other technology to agricultural business management; and state and federal regulations that govern agricultural business practices (e.g., handling and storage of pesticides, wages, workplace conditions).

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**OBJECTIVES**  
**FIELD 040: AGRICULTURE AND RENEWABLE NATURAL RESOURCES**

**Understand financial management practices.**

Includes basic accounting and recordkeeping procedures; records necessary for employees and for tax purposes; types, characteristics, sources, and costs of credit; the roles of banks and standard banking procedures in relation to agricultural business; types, characteristics, and purposes of insurance; factors that affect financial planning and management decisions in agricultural business settings; and applications of computers and other technology to financial management practices.

**Understand agricultural marketing principles and procedures.**

Includes types and characteristics of domestic and international market outlets and marketing strategies for agricultural products and services (e.g., cooperatives); factors involved in and procedures for setting prices; methods of advertising agricultural products and services; principles of selling and providing service; applications of computers and other technology to agricultural marketing; and government agencies, programs, and regulations related to agricultural marketing.

**Understand natural resource economics and policy.**

Includes basic principles of natural resource economics and the relationship between natural resource economics and policy; the influence of various factors on environmental and natural resource policy; issues related to natural resources in Colorado (e.g., water use, land use and development, air quality); state and federal policies and laws related to natural resources; and the effects of these policies and laws on natural resource management and decision making in Colorado.

**AGRICULTURAL MECHANICAL TECHNOLOGY**

**Understand mechanization and power transmission in agricultural systems.**

Includes basic operating principles of agricultural machinery and power equipment; diagnostic and troubleshooting techniques; and maintenance and repair procedures.

**Apply measurement, drawing, and surveying techniques and skills.**

Includes types, characteristics, and uses of measurement instruments; mathematical calculations related to measurement, design, and surveying; development and interpretation of working drawings; and basic surveying techniques.

**Understand equipment and technology related to irrigation systems and soil conservation practices.**

Includes basic principles of installation, operation, and maintenance for various types of irrigation and drainage systems; and operating and maintenance procedures for tillage equipment.

## OBJECTIVES

### FIELD 040: AGRICULTURE AND RENEWABLE NATURAL RESOURCES

#### **Understand construction and maintenance principles and techniques.**

Includes basic principles of carpentry, masonry, plumbing, electrical work, metalworking, and welding; tools, machinery, and other technology used in agricultural construction and maintenance and their operating principles; and techniques used to construct, repair, and maintain physical structures.

#### **Apply safety practices in the use of agricultural tools, equipment, systems, and processes.**

Includes safety procedures related to the care and use of equipment and machinery in agriculture; strategies and practices to promote safety in agriculture; the importance of proper maintenance in ensuring safety; and agencies, laws, and regulations that govern safety in agricultural settings.

## HORTICULTURE

#### **Understand greenhouse and nursery management principles and practices.**

Includes characteristics of greenhouse and nursery facilities; methods of regulating climate and other physical conditions; types and characteristics of horticultural growing media; greenhouse and nursery equipment and tools; methods of planting, propagating, maintaining, and harvesting horticultural plants; types and characteristics of common pests and diseases of greenhouse and nursery plants; pest management procedures; and procedures for the proper use and handling of fertilizers and pesticides in greenhouses and nurseries.

#### **Understand turf management principles and practices.**

Includes types and characteristics of grasses; factors that affect the selection of turf; methods of turf production; procedures for preparing an area for seeding or turf installation; turf maintenance practices; turf management tools and equipment and their uses; signs and symptoms of common turf pests and diseases; pest management procedures; and procedures for the proper application of fertilizers and pesticides to turf.

#### **Understand landscape design and ornamental horticulture principles and practices.**

Includes basic principles of landscape planning, design, construction, and maintenance; types and characteristics of ornamental plants; factors that influence the selection of ornamental plants for given purposes; methods of transplanting and maintaining ornamental plants; landscaping and horticultural tools and equipment and their uses; common pests and diseases of ornamental plants and methods of control; and procedures for the proper application of fertilizers and pesticides in landscape settings.

## **OBJECTIVES**

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#### **Understand floriculture principles and practices.**

Includes practices related to the production of cut flowers and flowering plants; factors that affect the development and blooming of flowers; methods of preparing, caring for, and handling flowers; tools and equipment used in floriculture; common pests and diseases of flowering plants and methods of control; and procedures for the proper application of fertilizers and pesticides in floriculture.

### **ENVIRONMENTAL AND NATURAL RESOURCES**

#### **Understand fishery and wildlife biology.**

Includes types and characteristics of important fish and wildlife species in Colorado; biological and ecological requirements of these species; common pests and diseases of fish and wildlife species; principles and methods of monitoring and managing fish and wildlife populations; and natural and human factors that affect fish and wildlife populations.

#### **Understand forestry principles and practices.**

Includes the environmental and economic importance of forests (e.g., wildlife habitat, watersheds, recreation); basic concepts and principles of forest ecology; soil and hydrologic characteristics of forests; principles and practices of forest management; silviculture practices; common pests and diseases and their control; characteristics of various harvesting techniques; the effects of forestry practices on the environment; and important tree species and forest products in Colorado.

#### **Understand principles and practices of natural resources and environmental management.**

Includes types and characteristics of important natural resources in Colorado; water management principles and practices and factors that influence water management decisions; the relationships among environmental and natural resources, agriculture, and society; the role of sustainable practices in natural resources and environmental management; and principles of multiple-use management and procedures for facilitating multiple use (e.g., grazing, recreation, mining) in various locations (e.g., rangelands, forests).

### **ANIMAL SCIENCE**

#### **Understand livestock, their products, and their uses.**

Includes breeds of beef and dairy cattle, sheep, swine, poultry, and horses; products derived from livestock; uses of livestock; procedures and criteria for evaluating live animals and carcasses; and processing and food safety practices.

## **OBJECTIVES**

### **FIELD 040: AGRICULTURE AND RENEWABLE NATURAL RESOURCES**

#### **Understand the anatomy, physiology, and reproduction of animals.**

Includes body systems and their components, functions, and interrelationships; physiological processes; the relationship between anatomical structures and physiological processes; the biology of reproduction in livestock; breeding methods; and the application of knowledge about anatomy, physiology, and genetics to the care, selection, and processing of animals.

#### **Understand principles and practices of animal production management.**

Includes principles and procedures for the safe and ethical handling of livestock; nutritional requirements of livestock; types and characteristics of feed and feed additives; the selection of appropriate feed and feeding schedules; purposes and methods of various animal production practices, such as dehorning, castrating, marking, docking, and medicating; procedures for the care of animals during pregnancy and parturition; common diseases and parasites of livestock, their symptoms, and methods for preventing and treating them; and the interpretation and use of data in making animal production management decisions.

#### **Understand environmental and facilities management in animal production.**

Includes environmental requirements of livestock (e.g., range requirements, temperature control); facilities, equipment, tools, technology, and practices used to provide and maintain appropriate conditions for livestock; and methods for maintaining sanitary conditions and managing waste.

## **PLANT AND SOIL SCIENCE**

#### **Understand the anatomy, physiology, and reproduction of plants.**

Includes plant structures, organs, and systems and their functions and processes; the processes of photosynthesis, respiration, and transpiration and their relationship to plant growth; the effects of environmental factors (e.g., temperature, humidity) on plant growth; the biology of reproduction and genetics in plants; and methods of breeding and asexually propagating plants.

#### **Understand principles and practices of plant production management.**

Includes types and characteristics of plants, crops, and seeds; the uses and products of various plants; requirements for the growth and development of various plants; considerations in selecting plants, crops, and seeds; principles and methods of propagating, transplanting, hardening, and growing plants; the determination of planting, harvesting, and crop rotation schedules; harvesting methods; types, characteristics, and symptoms of common plant pests, diseases, and weeds and methods of controlling them; procedures for the proper application and handling of fertilizers and pesticides in plant production; equipment, tools, and technology used to grow, harvest, and process crops; and the interpretation and use of data in making plant production management decisions.

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**Understand principles of soil science.**

Includes classifications, characteristics, and components of soil; soil testing methods and the interpretation and use of soil test results; effects of physical, chemical, and biological factors on soil; factors that affect the ability of soil to support plant growth; types and characteristics of fertilizers and other soil treatments; and methods for improving the ability of soil to support plant growth.

**Understand principles of land management, tillage, and irrigation.**

Includes land classification criteria; appropriate uses of various land classes; causes and characteristics of erosion and procedures for controlling erosion; land management planning procedures and factors that influence them; principles and methods of soil and water conservation; the selection and use of tillage, irrigation, and drainage methods; and factors that influence decisions about tillage, irrigation, drainage, and rotation practices.

**AGRICULTURAL COMMUNICATION, LEADERSHIP, AND CAREER DEVELOPMENT**

**Understand principles of agricultural communications.**

Includes purposes of agricultural communications; methods of communicating in agriculture (e.g., mass communication, public speaking) and their characteristics and applications; technical writing principles; applications of computers and other technology to agricultural communications; and considerations in communicating with diverse populations.

**Identify the characteristics and functions of career and technical student organizations.**

Includes the purposes of the organizations for secondary students (e.g., FFA) and for adults (e.g., Young Farmers); the role and responsibilities of the advisor; and organizational management including, but not limited to, parliamentary procedure, leadership, awards and recognition programs, and community service programs.

**Identify the characteristics and functions of supervised agricultural experience programs.**

Includes types of supervised agricultural experience programs, and program records and their characteristics.

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**Understand the role and functions of advisory committees.**

Includes the purpose, selection, and effective use of advisory committees to enhance secondary instruction and community relations.

**Identify career opportunities and requirements in agriculture.**

Includes career areas, opportunities, job titles, and prerequisites for career areas in agriculture; and procedures for securing and maintaining employment in agriculture.